CLAIMS

What is claimed is:

1   1.   A network architecture comprising:
2   a transport layer including an optical network;
3   at least one node having a large packet switch to couple to the transport layer
4   and to an access layer, the large packet switch to aggregate a plurality of services from
5   the access layer and to perform packet level grooming; and
6   wherein restoration is performed by the optical network.

1   2.   The network architecture of claim 1, wherein the optical network is an
2   optical ring network including at least one optical switch.

1   3.   The network architecture of claim 2, wherein restoration is performed at
2   a layer-0 (optical layer) of the optical ring network.

1   4.   The network architecture of claim 1, wherein the optical network is a bi-
2   directional line-switched ring (BLSR) utilizing a Synchronous Optical Network
3   (SONET) standard.

1   5.   The network architecture of claim 4, wherein restoration is performed by
2   a layer-1 (SONET layer).

1   6.   The network architecture of claim 1, wherein the access layer includes at
2   least one of a Time Division Multiplexed (TDM) voice service, a Internet Protocol (IP)
3   service, or an Asynchronous Transfer Mode (ATM) service.

1   7.   The network architecture of claim 1, wherein the access layer includes a
2   leased line service that is provided and restored through an optical switch of the
3   transport layer.

1   8.   The network architecture of claim 1, further comprising selecting
2   optimized core node locations for the placement of core nodes based upon a cost
3   optimization of an aggregated plurality of services aggregated by the large packet
4   switch, wherein at least one core node includes a large packet switch.

1   9.   The network architecture of claim 8, further comprising determining an
2   optimized converged optical network transport layer design for the aggregated plurality
3   of services based upon routed transport demands of the aggregated plurality of services.

1   10.   The network architecture of claim 8, further comprising determining an
2   optimized access layer network design for the aggregated plurality of services by
3   determining an optimal number of access devices and an optimal sizing of the access
4   devices for each service.

1   11.   A method for optimizing network architectures comprising:
2   generating a traffic model of a plurality of services to be carried through a
3   network;
4   performing a cost optimization for at least one of the plurality of services;
5   selecting core node locations for the at least one service based upon the cost
6   optimization of the at least one service;
7   generating routed transport demands based upon the traffic model;
8   determining at least one optimized transport layer network design for the at least
9   one service based upon routed transport demands; and
10   determining an optimized access layer network design for the at least one
11   service.

1   12.   The method of claim 11, wherein selecting core node locations for the at
2   least one service includes selecting core node locations for each service of the plurality
3   of services based upon a cost optimization for each service.

1   13.   The method of claim 11, wherein determining the at least one optimized
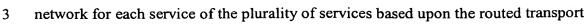2   transport layer network design includes determining an optimized transport layer

-22-

3   network for each service of the plurality of services based upon the routed transport

4   demand of each service.

1   14.   The method of claim 11, wherein determining an optimized access layer

2   network design for at the least one service includes determining an optimal number of

3   access devices for each service of the plurality of services and an optimal sizing of the

4   access devices for each service.

1   15.   The method of claim 11, wherein selecting core node locations for the at

2   least one service includes selecting core node locations for an aggregated plurality of

3   services based upon a cost optimization of the aggregated plurality of services.

1   16.   The method of claim 15, wherein determining the at least one optimized

2   transport layer network design for the at least one service includes determining an

3   optimized converged optical network transport layer design for the aggregated plurality

4   of services based upon routed transport demands.

1   17.   The method of claim 15, wherein determining an optimized access layer

2   network design for the at least one service includes determining an optimized access

3   layer network design for the aggregated plurality of services by determining an optimal

4   number of access devices and an optimal sizing of the access devices for each service

5   of the aggregated plurality of services.

1   18.   A method for designing a network architecture comprising:

2   provisioning an optical network as part of a transport layer;

3   coupling at least one node having a large packet switch to the transport layer

4   and to an access layer;

5   aggregating a plurality of services from the access layer with the large packet

6   switch;

7   performing packet level grooming with the large packet switch; and

8   performing restoration utilizing the optical network.

1   19.   The method of claim 18, wherein the optical network is an optical ring

2   network including at least one optical switch.

1   20.   The method of claim 19, wherein restoration is performed at a layer-0

2   (optical layer) of the optical ring network.

1   21.   The method of claim 18, wherein the optical network is a bi-directional

2   line-witched ring (BLSR) utilizing a Synchronous Optical Network (SONET) standard.

1   22.   The method of claim 21, wherein restoration is performed by a layer-1

2   (SONET layer).

1   23.   The method of claim 18, wherein the access layer includes at least one

2   of a Time Division Multiplexed (TDM) voice service, a Internet Protocol (IP) service,

3   or an Asynchronous Transfer Mode (ATM) service.

1   24.   The method of claim 18, wherein the access layer includes a leased line

2   service that is provided and restored through an optical switch of the transport layer.

1   25.   The method of claim 18, further comprising selecting optimized core

2   node locations for the placement of core nodes based upon a cost optimization of an

3   aggregated plurality of services aggregated by the large packet switch, wherein at least

4   one core node includes a large packet switch.

1   26.   The method of claim 25, further comprising determining an optimized

2   converged optical network transport layer design for the aggregated plurality of

3   services based upon routed transport demands of the aggregated plurality of services.

1   27.   The method of claim 25, further comprising determining an optimized

2   access layer network design for the aggregated plurality of services by determining an

3   optimal number of access devices and an optimal sizing of the access devices for each

4   service.

1   28.   A machine-readable medium having stored thereon instructions, which

2   when executed by a machine, causes the machine to perform operations comprising:

3   generating a traffic model of a plurality of services to be carried through a

4   network;

5   performing a cost optimization for at least one of the plurality of services;

6   selecting core node locations for the at least one service based upon the cost

7   optimization of the at least one service;

8   generating routed transport demands based upon the traffic model;

9   determining at least one optimized transport layer network design for the at least

10   one service based upon routed transport demands; and

11   determining an optimized access layer network design for the at least one

12   service.

1   29.   The machine-readable medium of claim 28, wherein the operation of

2   selecting core node locations for the at least one service includes selecting core node

3   locations for each service of the plurality of services based upon a cost optimization for

4   each service.

1   30.   The machine-readable medium of claim 28, wherein the operation of

2   determining the at least one optimized transport layer network design includes

3   determining an optimized transport layer network for each service of the plurality of

4   services based upon the routed transport demand of each service.

1   31.   The machine-readable medium of claim 28, wherein the operation of

2   determining an optimized access layer network design for at the least one service

3   includes determining an optimal number of access devices for each service of the

4   plurality of services and an optimal sizing of the access devices for each service.

1   32.   The machine-readable medium of claim 28, wherein the operation of

2   selecting core node locations for the at least one service includes selecting core node

3   locations for an aggregated plurality of services based upon a cost optimization of the

4   aggregated plurality of services.

1   33.   The machine-readable medium of claim 32, wherein the operation of

2   determining the at least one optimized transport layer network design for the at least

3   one service includes determining an optimized converged optical network transport

4 layer design for the aggregated plurality of services based upon routed transport

5 demands.

1   34.   The machine-readable medium of claim 32, wherein the operation of

2 determining an optimized access layer network design for the at least one service

3 includes determining an optimized access layer network design for the aggregated

4 plurality of services by determining an optimal number of access devices and an

5 optimal sizing of the access devices for each service of the aggregated plurality of

6 services.